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10/659,069
GP1209USNA
RESPONSE

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF:

MARTIN LEONHARD DREHER ET. AL. CASE NO.: GP1209USNA

SERIAL NO.: 10/659,069 GROUP ART UNIT: 1752

FILED: SEPTEMBER 10, 2003 EXAMINER: SIN J. LEE

CONFIRMATION NO.: 2752

FOR: PRINT CONTROL FOR FLEXOGRAPHIC PRINTING

RESPONSE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Reconsideration of this rejection is respectfully requested.

The rejection of Claims 1 through 11 and 14 through 17 as being unpatentable over Metzger (DE 199 09 152 A1 and its DERWENT English abstract) in view of Hatsuda (JP 2002-137558A), under 35 U.S.C. 103(a), is respectfully traversed. Claims 1 and 10 recite a flexographic printing form containing an imagewise printing relief and a process for preparing the printing form comprising a support and at least one elastomeric layer on the support having a top surface containing the imagewise printing relief, wherein the top surface also contains in a non-image area a print control element 1 comprising relief elements 5 with defined height differences. The print control element 1 can be produced by impressing a negative matrix of the print control element 1 into the top surface of the outermost photopolymerizable layer, compressing the layer to adopt the form of the matrix and form the relief elements 5 of different heights. The shape of the print control element 1 is retained by photopolymerizing the relief elements 5 formed by the matrix in the layer. The print control element 1 can also be produced by laser-engraving a reinforced elastomeric layer. Alternatively, the print control element can be produced by filtering the actinic UV light through a high-resolution pattern that is imaged into a digital phototool. The height of the relief elements 5 is controlled through the shape of the high-resolution pattern.

Metzger discloses a photopolymerizable recording element comprising a substrate layer, photopolymerizable layer containing polymeric binding agent, ethylenically unsaturated compound and photoinitiator, and an IR sensitive and actinic radiation opaque layer. A wax adhesion layer is situated between the photopolymerizable layer and the IR sensitive layer. The photopolymerizable recording element is useful for the production of flexographic printing plates.

Hatsuda discloses a printing plate having raised printing features in a printing area 12 and raised quality verifying features in a quality verifying area 13. The quality verifying features are formed at the same time as the raised printing features and verify the quality of the printing features in the printing area 12. The quality verifying features are raised in the form of patterns of halftone dots. The halftone dots have a surface area ratio that varies stepwise from one quality verifying feature to an adjacent quality verifying feature. Each of the quality verifying features in the quality verifying area of Hatsuda has *a surface area ratio that varies stepwise* from one feature to the next feature. However, the elements 5 having defined height differences of the present invention are not the same as, nor obvious from, the features that have a surface area ratio that varies stepwise according to Hatsuda.

Hatsuda provides no specific description of the meaning of the term "stepwise"; however, the term has a meaning well understood by those skilled in the art, representing approximately 0.4% minimal rate of change between halftone steps. The human eye can detect approximately 256 levels of gray between black and white. So that (1/255) (100) equals the percent rate of change from one level of gray to a next level of gray (0.4%), which can also be referred to as the rate of change from one step to the next step. Printing is a binary procedure in which ink is present or not in an addressable position, that is, an area that is either black or white. So that the printing of text and lines is straightforward; ink is either printed or it is not. But the printing of a continuous tone image is not so straightforward. A continuous tone image, such as a photograph, typically has multiple levels of gray between black and white. Since printing is a binary process and ink is either present or not, the printing of a continuous tone image should simulate all the possible levels of gray from the lightest grays, so called highlight areas, to the darkest grays, so called shadow areas. To accomplish this, a continuous tone image is reproduced by a screening process that converts the image into dots of various sizes and equal spacing between centers, so called halftone reproduction. Each dot is a portion of a discrete area that is printed (i.e., halftone dots), such that the composite of the printed dots simulates the desired level/s of gray. The dot size is usually

expressed as a percentage, for example, a 2% dot represents a dot size wherein 2% of the discrete area is printed, and a 95% dot represents a dot size wherein 95% of the discrete area is printed. To reproduce all 256 levels of gray, the halftone dots would then change in size (surface area relative to the discrete area) by 0.4% from one dot size to an adjacent dot size.

Thus in Hatsuda, the term "stepwise" is a description of the relationship between *the surface area* of the halftone dots (printed area relative to discrete area) used for each feature of the quality verifying area 13. So Hatsuda's description that the quality verifying area 13 has features with a surface area ratio that varies stepwise is merely indicating that the features are halftone dots that change in printed size relative to the discrete area, according to the level of gray one wants represented. This understanding is further supported in Figure 1 of Hatsuda where the quality verifying area 13 is shown as having 4 quality verifying features from dark to lightly shaded. Each feature has a particular dot size (for example 98%, 66%, 33%, 2%) representing a particular level of gray, which changes in size by the surface area printed relative to a discrete area. In Figure 1, Hatsuda depicts only 4 levels of gray for the features in the quality verifying area 13 of the 256 levels of gray that are possible. The 4 levels of gray represents a stepwise change in dot size from one feature to the next feature of greater than the 0.4% minimal rate of change between halftone steps if all 256 levels of gray were used. Clearly, Hatsuda uses the term "stepwise" to describe the relationship of the surface area ratio of printed area to discrete area between quality verifying features, and is <u>not</u> a description of the relationship in height of the quality verifying features.

Furthermore, Hatsuda describes (translation, page 7 bridging 8, paragraph 0017) that since the quality verifying features are formed at the same time as the raised printing features, the quality of the raised quality verifying features is identical with the quality of the raised printing features in the printing area. Hatsuda also describes (translation, page 4, paragraph 0002, Prior Art) that raised features may lack sharpness at the edges or be undesirable in other respects, which can result in product having *low raised features*. (See also translation, page 9, paragraph 0023.) Since it is possible for the raised printing features of the printing area 12 to have different heights, the resulting raised quality verifying features may also inherently have different heights. Clearly, the quality verifying features of Hatsuda may naturally *but unpredictably vary in height*.

In contrast, the flexographic printing form of the present invention comprises a print control element 1 having relief elements 5 with <u>*defined height differences*</u> from one relief element to the next relief element. Each relief element has a defined height (measured from

the floor) different from the relief element adjacent to it. The defined height differences of the relief elements are prepared by any of the described methods including: embossing a negative matrix form into the photopolymerizable layer and exposing the printing form to actinic radiation; laser engraving a reinforced elastomeric layer of the printing form; or for a printing form having an IR sensitive layer, by filtering actinic radiation through a high-resolution pattern imaged digitally in the IR sensitive layer. Applicants acknowledge that the relief height in *the imaged printing area* can vary in an undefined way, however each of the inventive methods used to prepare the print control element 1 are effective to create relief elements 5 in the print control element 1 that have *defined* height differences. As such, the relief elements 5 of the print control element 1 of the present invention, unlike the quality verifying features of the quality verifying area 13 in Hatsuda, do not vary in an undefined way. Although the relief elements can have any geometric form, the height of each of the relief elements 5 varies from the adjacent relief element by a defined height difference of 5 to 30 μm. In the present specification, Figure 1 is a cross-sectional view of a non-image area of a flexographic printing plate 10 showing a print control element 1 having multiple relief elements 5, each relief element 5 with a defined height (as measured from the floor 2) different from the relief element adjacent to it. A flexographic printing form having the print control element 1 with defined height differences allows for a pressman to directly analyze and adjust the impression settings in the printing process during test printing runs, and thereby easily and quickly optimize high quality printing on press.

Regarding Claim 14, Hatsuda alone nor in combination with Metzger does not teach or suggest a process of preparing a flexographic printing form by exposing the infrared sensitive layer to infrared laser radiation to form *a high resolution pattern capable of filtering actinic radiation* during the exposing *step to form the print control element* having relief elements *with defined height differences*. For a printing form having an IR sensitive layer, the print control element 1 of the present invention is prepared by filtering actinic radiation through a high resolution pattern imaged digitally in the IR sensitive layer. The high-resolution pattern reduces the amount of actinic radiation that is available for photopolymerization behind the digital phototool in a defined way, thus lowering the height of the photopolymerized relief element. The height of the polymerization structure is controlled through the shape of the high-resolution pattern. The use of a high-resolution pattern capable of filtering actinic radiation to control the height of the relief elements 5 with defined height differences, as recited in Claim 14, is not taught or suggested by the cited prior art.

Therefore, Hatsuda alone or in combination with Metzger neither shows nor suggests a print control element 1 having relief elements 5 with *defined height differences,* as presently recited in Claims 1 and 10. Each of the quality verifying features in the quality verifying area 13 of Hatsuda has *a surface area ratio that varies stepwise* from one feature to the next feature. Relief elements having the defined height differences of the present invention are not the same as, nor obvious from, features that have a surface area ratio that varies stepwise according to Hatsuda. Since the combination of Hatsuda with Metzger neither shows nor suggests the present print control element 1 having relief elements 5 with defined height differences, it is respectfully submitted that the present invention as defined by Claims 1 and 10 is patentable over such combination.

Patentability relies upon the distinctive limitations recited in present Claims 1 and 10. Claims 2 through 9, which ultimately depend from Claim 1, incorporate the patentable novelty of Claim 1, and Claims 11 and 14 through 17, which ultimately depend from Claim 10, incorporate the patentable novelty of Claim 10. Therefore, the allowance of such claims appears to be in order for at least the reasons given with respect to Claims 1 and 10.

Reconsideration and allowance of this application are respectfully requested.

Respectfully submitted,

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